Freistaat Thüringen
Landesamt für Denkmalpflege und Archäologie

TWO (SWORDS) HANDLES – TWO METHODS OF THE PRESERVATION

Two sword hilts were found in 2003 during an excavation of a latrine (fig. 3) at the Eichplatz (fig. 2) in Jena (Thuringia, Germany fig. 1). The hilts were roughly cleaned and initially stored in a fridge by the archeologist. Then they were moved to a special refrigerating system and kept at -20 °C up to their treatment in late 2014. Based on their size the hilts could either have belonged to children's swords or perhaps to epees. Due to their different construction and materials different approaches had to be applied to preserve the two hilts.

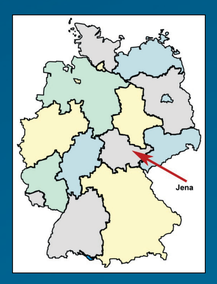

fig. 1: Germany

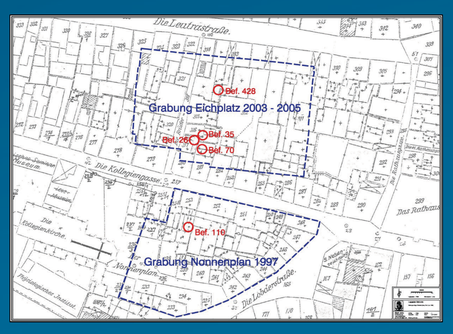

fig. 2: excavation Jena, Eichplatz

fig. 3: Jena, Eichplatz, latrine 26/03

Hilt 1 (fig. 4 and 5) was made from coniferous wood (fir) which was shaped pentagon ally and tapered at both ends. This was then wrapped in an approximately 4-5mm thick layer of a plant fiber (presumably grass stalks). This "upholstery" was bound diagonally with leather strips and two twisted brass wires. The seven leather strips were alternated with the wires. The hilt is not complete. Half of the "upholstery" and its binding are missing. In the better preserved section the remains of a tang (presumably of the sword) are still recognizable.

fig. 4: hilt 1, before treatment

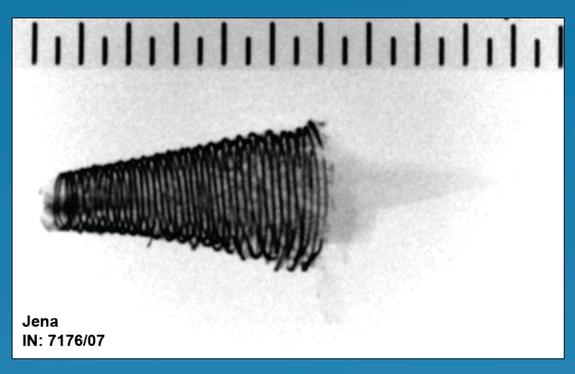

fig. 5: hilt 1, before treatment, X-ray image

Hilt 2 (fig. 6 and 7) was made from hardwood (maple) and decorated with carvings. 18 small ornamental discs made from tin were secured on the surface with small nails. The remains of simple iron wire plaits are visible on both sides of the hilt. A brass-plated ribbon surrounds the pommel-side of the hilt. There is no such ribbon on the side closer to the blade. The tang of the iron sword is preserved fragmentarily inside the hilt and pommel. The hilt is in two parts (hilt and pommel) as the tang broke.

fig. 6: hilt 2, before treatment

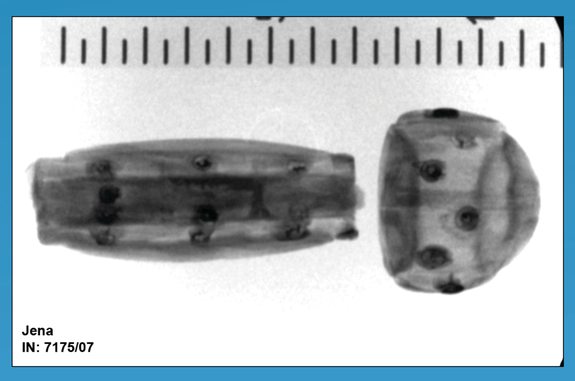

fig. 7: hilt 2, before treatment, X-ray image

Considering the advantages and disadvantages of the different methods it was decided to preserve hilt 1 with PEG 600 as it is predominantly made from organic material (wood, grass and leather). The wood is reasonably well preserved and therefore the focus was on the stabilization of the leather and the grass stalks. A different approach was used for hilt 2 as the wood is much more decayed than that of hilt 1. The hilt is also covered in an iron-rich calcareous layer, which has partly penetrated the wood. Due to the material combination of wood, tin and steel and also the author's positive experience of using Paraloid B72 with wood-iron combinations it was decided to consolidate hilt 2 with Paraloid B72 dissolved in acetone. This also has the advantage that Paraloid B72 could be used to re-adhere the two parts of the hilt after their consolidation.

After initial cleaning with water and paintbrushes hilt 1 was placed in a bain-marie to extract any soluble remains from burial. Subsequently the object was treated with an aqueous Komplexon III solution (Na_2EDTA, fig. 8). This was to further remove any remains from burial and also any metal ions from the brass elements that may have accumulated within the leather and plant fiber elements. The risk of also extracting tanning agents from the leather was accepted on this occasion. The object was rinsed with water after the treatment and the hilt was then consolidated in an aqueous solution of PEG 600 (fig. 9). The object was immersed in solutions of increasing concentrations up to 40%. Using a vacuum the immersion period could be shortened from 45 to 10 days. The leather, brass wire and wood were in a stable condition after freeze-drying (fig. 10). However, the plant fibers remained brittle and required further treatment to allow for safe handling of the hilt. Sufficient consolidation of the grass fibers was finally achieved using 10 % Mowital B 30 H dissolved in Isopropanol.

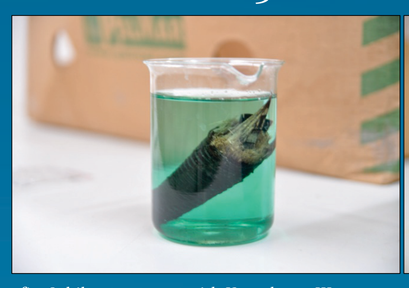

fig. 8: hilt 1, treatment with Komplexon III

fig. 9: hilt 1, treatment with PEG 600

fig. 10: hilt 1 in the freeze dryer

The treatment of hilt 2 began with careful cleaning under running water. Then the hilt parts were kept in a mixture of ethanol and water. Over four months the proportion of ethanol was steadily raised from an initial ratio of 1:9 in order to carefully replace any water and dissolvable remnants from burial of the wood. Then the ethanol was replaced with acetone, again by carefully changing the proportions over a period of four months. Subsequently the hilt was consolidated under vacuum with a 35% solution of Paraloid B 72 in acetone (fig. 11). This took another four months and finally the object was carefully air dried underneath plastic sheeting (fig.12). Calcareous layers could then be carefully removed with a scalpel (fig. 13) and the two parts were re-joined using Paraloid B72 (50% in acetone).

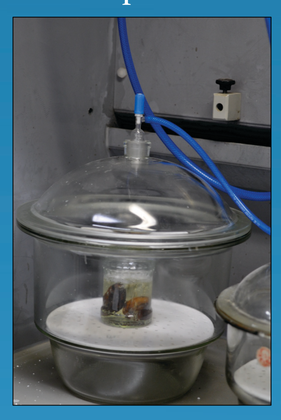

fig. 11: hilt 2 impregnate with Paraloid B 72

fig. 12: hilt 2 after impregnation ant desiccation

fig. 13: hilt 2, detail after exposure with scalpel

During the treatment of hilt 1 with Komplexon III the risk of dissolving tanning agents was accepted. The author's experience of the last years is that leather tends to have a natural appearance after using this chelating agent and also retains a slight flexibility due to the subsequent treatment with PEG 600. A chelating agent was also considered for the removal of calcareous deposits from hilt 2. However, the risk of compromising the metal elements or their corrosion products was deemed too high. Therefore the option of using a solvent based consolidant after careful removal of any water was preferred. The results were satisfactory for both archeologists and conservators. Both hilts can now be safely handled and scientifically investigated (fig. 14 and 15).

fig. 14: hilt 1 after the treatment

fig. 15: hilt 2 after the treatment

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